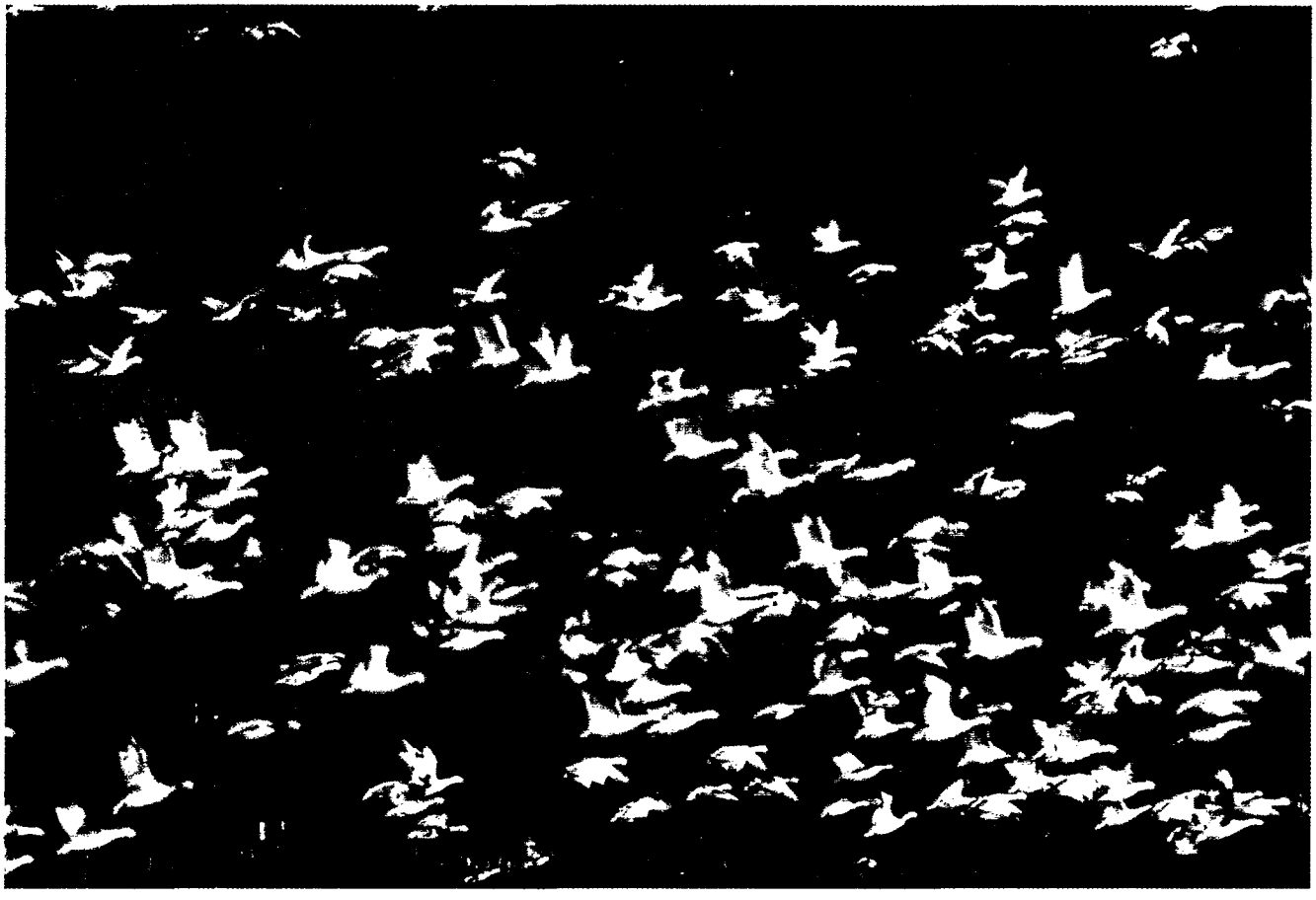
CHAPTER IV K

San Luis National Wildlife Refuge Alternative Plans



U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
MID-PACIFIC REGION

CHAPTER IV K

SAN LUIS NATIONAL WILDLIFE REFUGE

The Migratory Bird Conservation Commission created the 7,360-acre San Luis National Wildlife Refuge (Refuge) in 1966 under the Migratory Bird Conservation Act. The Refuge was expanded in 1970 to 7,430 acres with proceeds from the sale of duck stamps. The Refuge is located 12 miles northeast of the City of Los Banos and lies within the Grassland Resource Conservation District (GRCD). The Refuge is managed by the Service and provides nesting, migration, and wintering habitat for ducks and geese; habitat for other migratory birds; and recreational opportunities. The Refuge also preserves valuable native grasslands.

The Refuge is an interior island, flanked by riparian zones along the Salt Slough on the west and the San Joaquin River on the east, as shown on Figure IV K-1. Land use on the Refuge can be classified as mixed marsh, upland, and riparian habitat. Natural and man-made marshlands are managed for maximum moist-soil plant production. Native grasslands support a diversity of flora and fauna indigenous to the Central Valley.

Under current management practices, water is provided to the ponds and sloughs at least once during the summer months for volunteer perennial and annual marsh plants. Flooding of the marshes begins in mid-September. Water deliveries are continued as needed throughout the remainder of the winter. Usually, by the end of February, the seasonal rains are sufficient to maintain the marshes. The mixed marsh is flooded periodically to maintain the vegetation. Approximately 100 acres of mixed marsh are irrigated several times during the summer months and managed to produce herbaceous browse for tule elk. Riparian habitat located away from Salt Slough and the San Joaquin River requires at least one summer irrigation (USBR, 1986a).

A. WATER RESOURCES

The Refuge holds 19,910 acre-feet of water rights on Salt Slough which forms the western boundary of the Refuge. However, this water source contains high levels of selenium and cannot be used for refuge management.

The Refuge receives agricultural return flows from the San Luis Canal Company (SLCC) through deed encumbrances on an as-available basis. SLCC also conveys surplus Central Valley Project (CVP) water to the Refuge.

1. Surface Waters

Salt Slough is an intermittent stream that flows along the western refuge boundary and eventually flows into the San Joaquin River.

Most of the water in Salt Slough originates from operational spills, waste, and return flow from the SLCC and the Central California Irrigation District (CCID). However, Mud Slough flows into Salt Slough immediately upstream of the Refuge. The Mud Slough water contains high selenium concentrations. In 1985, Salt Slough water was determined to be unacceptable for refuge management due to selenium contamination (>2 ppb). Therefore, the Service has discontinued using Salt Slough for waterfowl habitat management (USFWS, 1987i).

The SLCC delivers surplus CVP water to replace the Salt Slough water. The SLCC also delivers CVP water purchased by Reclamation for the Refuge.

The Refuge has agreed, via deed encumbrances, to receive agricultural return flows from the SLCC. This water is received from neighboring lands at three points along the southern refuge boundary. The source is not dependable and, until recently, has not been measured. It is estimated by the Service to range from 800 to 4,000 acre-feet per year.

2. Water Conveyance Facilities

The SLCC is currently transporting CVP water to the Refuge through three conveyances, the Noble Ditch, Island "C" Canal, and Island "D" Canal, as shown on Figure IV K-1 (USBR, 1986a). The SLCC Noble Ditch is located along the southern boundary of the Refuge. The SLCC Island "C" Canal enters the Refuge in the southeast corner and extends to Dickenson Ferry Road. The SLCC Island "D" Canal extends into the southwestern section of the Refuge.

The SLCC Island "C" Canal could be used to transport flows from the San Joaquin River if water was available. However, the canal capacity is only 20 cfs.

Use of the SLCC facilities to convey refuge water has caused some drainage problems. Water seeps from the unlined canals into surrounding farmlands. The SLCC drains the canals during the non-irrigation season to relieve this problem and to complete maintenance procedures. However, the Refuge requires water deliveries during the non-irrigation season.

Two lift stations have been used to convey water from Salt Slough to the west side of the Refuge. Lift Station 1 contains two pumps, Pumps 1A and 1B, and has a total capacity of 50 cfs. Lift Station 5 has a total capacity of 15 cfs.

Three other lift stations are used throughout the Refuge. Lift Stations 2 and 3 are located along the southern border and have capacities of 60 and 55 cfs, respectively. Lift Station 4, with a capacity of 15 cfs, is located near the northwest corner of the Refuge.

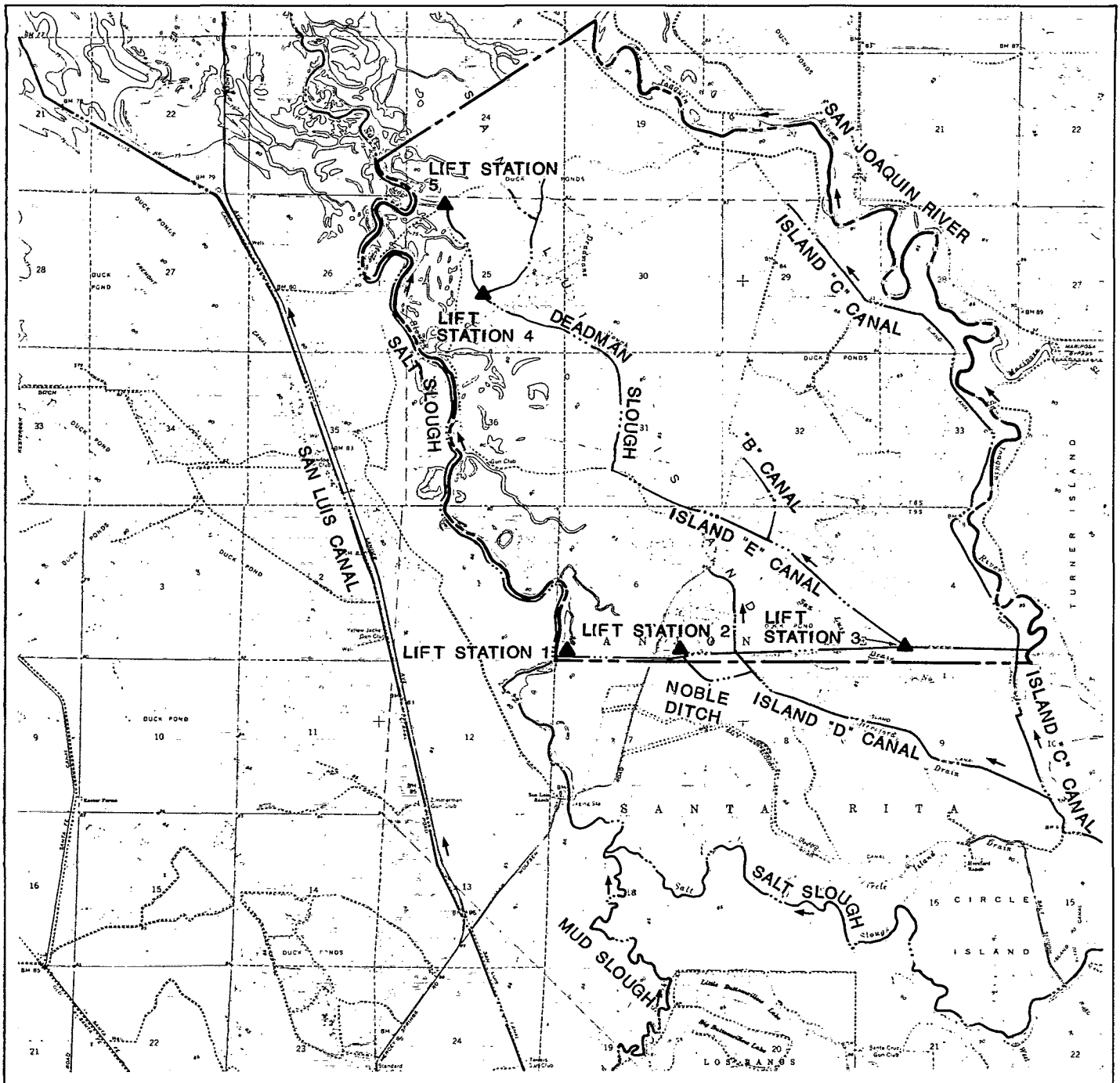


FIGURE IV K-1

SAN LUIS NATIONAL WILDLIFE REFUGE

EXISTING WATER SUPPLY FACILITIES

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The water conveyance system within the Refuge has had major problems caused by the inability to bypass certain areas of marshlands when needed. Many improvements have been made to allow the Service to minimize the use of energy-intensive low-lift pumps.

3. Groundwater

The general groundwater conditions of the Refuge are similar to the conditions described for the GRCD in Chapter IV G of this report.

Groundwater is only used for domestic supplies. Water table seasonal fluctuations vary from 10 to 20 feet. Reclamation has estimated that the safe yield is 18,700 acre-feet per year (USBR, 1986c).

B. FORMULATION AND EVALUATION OF ALTERNATIVE PLANS

The Service estimates that 19,000 acre-feet of water would be required for full development and optimum management of the entire Refuge. For the purposes of assessing the impacts of water delivery alternatives, four levels of water supply have been identified, as presented in Table IV K-1. Each of the water supply levels provides a different volume of water and are summarized as follows:

Level 1 -Existing firm water supply

Level 2 -Current average annual water deliveries

Level 3 -Water supply needed for full use of existing development

Level 4 -Water delivery needed for optimum management

1. Delivery Alternative for Level 1 (No Action Alternative) (0 acre-feet)

The Refuge does not have a useable firm water supply. Therefore, no alternatives were identified for Level 1.

2. Delivery Alternatives for Level 2 (13,350 acre-feet)

Alternatives 2A and 2B were developed to improve the capabilities of SLCC to deliver CVP water to Refuge. Alternative 2C would provide facilities for a conjunctive use program. All of these alternatives would require implementation of the Zahm-Sansoni-Nelson Plan. This plan was described in Chapter IV G.

Alternative 2A - Enlarge and Line San Luis Canal Company Facilities. To reduce the amount of water lost in seepage from the SLCC canals and provide adequate capacity to convey both agricultural and refuge water supplies, 28,000 feet of canals would be replaced with pipelines, as shown in Figure IV K-2. The Service

TABLE IV K-1

DEPENDABLE WATER SUPPLY NEEDS

ALTERNATIVE SUPPLY LEVELS FOR THE SAN LUIS NWR

Month	Supply Level 1 ac-ft	Supply Level 2 ac-ft	Supply Level 3 ac-ft	Supply Level 4 ac-ft
January	0	500	1,000	1,000
February	0	700	1,000	1,000
March	0	1,000	1,000	1,000
April	0	550	1,250	1,250
May	0	550	1,500	1,500
June	0	1,700	1,500	1,500
July	0	350	1,250	1,250
August	0	200	1,000	1,000
September	0	1,000	1,000	1,000
October	0	3,350	4,000	4,000
November	0	2,500	3,000	3,000
December	0	950	1,500	1,500
Total	0	13,350	19,000	19,000

Notes:

Supply Level 1: Existing firm water supply
Supply Level 2: Current average annual water deliveries
Supply Level 3: Full use of existing development
Supply Level 4: Optimum management

Sources: USBR, 1986a; USFWS, 1986d and 1986e

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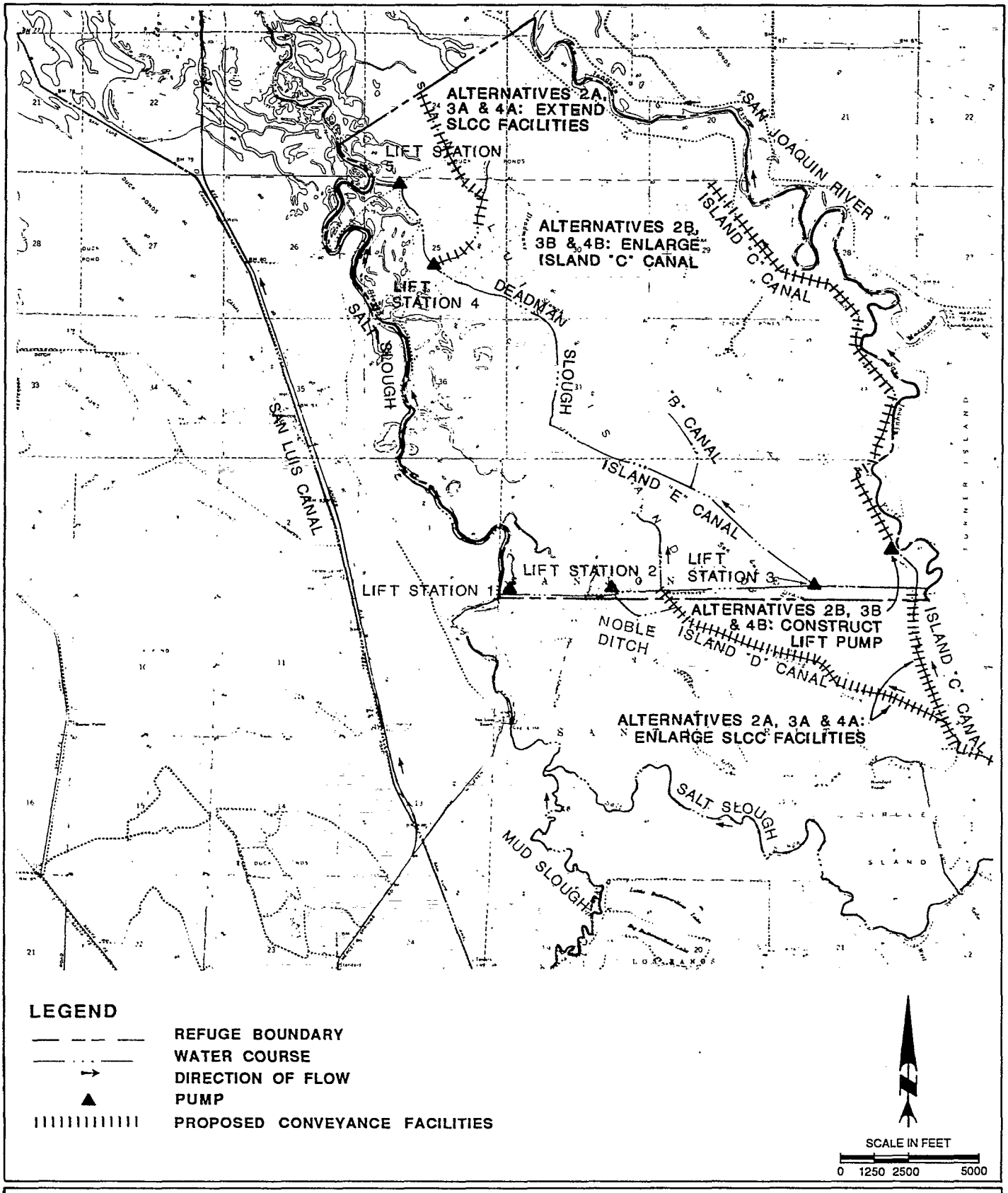

FIGURE IV K-2

SAN LUIS NATIONAL WILDLIFE REFUGE

ALTERNATIVE WATER SUPPLY FACILITIES

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and the SLCC would coordinate water deliveries and maintenance procedures to minimize impacts to the Refuge.

Alternative 2B - Construct Lift Pump to Utilize San Joaquin River Water. To convey water from the San Joaquin River to the Refuge through the SLCC Island "C" Canal, the capacity of the canal would be increased from 20 cfs to 40 cfs. Three existing siphon pipes would be replaced with larger pipes. A 40 cfs pump also would be installed. Internal conveyances would be changed to accommodate water deliveries from the east instead of the west. This alternative would require water rights or a CVP contract to receive water from the San Joaquin River.

Alternative 2C - Implement a Conjunctive Use Plan. Seventeen wells would be constructed on the Refuge to deliver the maximum month water demand. The exact locations of the wells would be determined in a future study. The wells would be developed as part of a conjunctive use program. During dry years, water demands would be supplied by wells, as discussed in Chapter III. During wet years, the wells would probably not be needed if CVP water is provided. Implementation of this alternative also would require implementation of Alternative 2A or 2B to deliver surface water during wet years.

3. Delivery Alternatives for Level 3 (19,000 acre-feet)

The additional water would be used to increase permanent water and watergrass, and to provide flushing flows to improve salt balance. Alternatives for Level 3 are similar to those discussed for Level 2.

Alternative 3A - Enlarge and Line San Luis Canal Company Facilities. This alternative is identical to Alternative 2A.

Alternative 3B - Construct Lift Pump to Utilize San Joaquin River Water. This alternative is identical to Alternative 2B.

Alternative 3C - Implement a Conjunctive Use Plan. This alternative is similar to Alternative 2C. Twenty wells would be constructed on the Refuge to deliver the maximum month water demand under Level 3. Implementation of this alternative also would require implementation of Alternative 3A or 3B to deliver surface water during wet years.

4. Delivery Alternatives for Level 4 (19,000 acre-feet)

Water Supply Level 4 is equal to Level 3. Therefore, the alternatives for Level 4 are identical to alternatives for Level 3.

Alternative 4A - Enlarge and Line San Luis Canal Company Facilities. This alternative is identical to Alternatives 2A and 3A.

Alternative 4B - Construct Lift Pump to Utilize San Joaquin River Water. This alternative is identical to Alternatives 2B and 3B.

Alternative 4C - Implement a Conjunctive Use Plan. This alternative is identical to Alternative 3C.

5. Summary of Alternatives

The beneficial and adverse effects of each alternative were compared with respect to the criteria listed in Chapter III.

There are no alternatives for Level 1 because the Refuge does not have a useable firm water supply.

All alternatives would require the implementation of the Zahm-Sansoni-Nelson Plan, as discussed in Chapter IV G of this report.

Alternatives 2A and 2B; 3A and 3B; and 4A and 4B would require long-term conveyance agreements with the SLCC.

The conjunctive use alternatives (Alternatives 2C, 3C, and 4C) would require implementation of a surface water alternative (Alternatives 2A or 2B, 3A or 3B, or 4A or 4B, respectively) to deliver surface water during wet years.

C. COSTS AND ECONOMIC ANALYSIS

Costs for the alternative plans to provide adequate water supplies under Water Delivery Levels 2, 3, and 4 are presented in Table IV K-2. The construction costs include factors to cover engineering, contingencies, and overhead. Annual operation and maintenance (O&M) costs include only the local cost of delivering water. The annual O&M costs do not include costs to purchase CVP water. During the advanced planning phase, these costs will be refined further.

Construction of the improvements under the various water delivery alternatives would result in additional money being spent in Merced County during construction. The construction would probably be completed over a two to four year period by construction workers who reside in Merced County.

Currently, the annual public use to the Refuge averages 22,400 visits per year (Level 2). If additional water is provided to the Refuge, public-use levels would increase.

F. WILDLIFE RESOURCES

The annual bird use on the Refuge is approximately 13,362,000 use-days. Wildlife and fishery resources associated with the Refuge are presented in Table IV K-3. The listed threatened and endangered species associated with the Refuge are the San Joaquin kit fox, Vulpes macrotis mutica; the bald eagle, Haliaeetus leucocephalus; the American peregrine falcon, Falco

TABLE IV K-2

SUMMARY OF ESTIMATED COSTS OF ALTERNATIVES

SAN LUIS NWR

Items	Alternatives					
	2A	2B	2C	3A & 4A	3B & 4B	3C & 4C
Additional Water (ac-ft)	13,350	13,350	13,350	19,000	19,000	19,000
Construction Costs						
Wells	$ --	$ --	$ 901,000(d)	$ --	$ --	$1,060,000
Diversion Structures	627,000	--	--	627,000	--	--
Pipelines/Canals	2,062,000(a)	19,900(b)	--	2,062,000(a)	19,900(b)	--
Pump Stations	--	234,000(c)	--	--	234,000(c)	--
Subtotal	$2,689,000	$253,900	$ 901,000	$2,689,000	$253,900	$1,060,000
Other Costs	--	--	2,689,000(e)	--	--	2,689,000(e)
Total (g)	$2,689,000	$253,900	$3,590,000	$2,689,000	$253,900	$3,749,000
Annualized Construction Cost (8.87%, 30 yrs)	$ 258,680	$ 24,430	$ 345,360	$ 258,680	$ 24,430	$ 360,660
Additional Annual Cost						
Operation & Maintenance(h)	$ 10,500	$ 3,900	$ 30,600	$ 10,500	$ 3,900	$ 36,000
Power	--	20,000(j)	61,750(k,l)	--	28,500(j)	87,900(k,l)
Local Conveyance Cost	133,500(i)	133,500(i)	--	190,000(h)	190,000(i)	--
Subtotal	$ 144,000	$157,400	$ 92,350	$ 200,500	$222,400	$ 123,900
Other Costs	--	--	72,000(e,l)	--	--	100,250(e,l)
Total	$ 144,000	$157,400	$ 164,350	$ 200,500	$222,400	$ 224,150
Total Annual Costs	$ 402,680	$181,830	$ 509,710	$ 459,180	$246,830	$ 584,810
Cost/Additional Acre-Foot	$ 30.20	$ 13.60	$ 38.20	$ 24.20	$ 13.00	$ 30.80

TABLE IV K-2

SUMMARY OF ESTIMATED COSTS OF ALTERNATIVES

SAN LUIS NWR
(Continued)

Notes: Alternatives 2A, 3A and 4A - Enlarge and Line San Luis Canal Company Facilities.
Alternatives 2B, 3B, and 4B - Construct Lift Pump to Utilize San Joaquin River Water.
Alternatives 2C, 3C, and 4C - Implement a Conjunctive Use Plan.

(a) Line 59,000 feet of canals with bentonite, 65 cfs; and construct 28,000 feet of 48-inch diameter pipeline.

(b) 200 feet, 42-inch diameter pressure pipelines, 40 cfs; 3 road crossings.

(c) 40 cfs pump, 20-foot lift.

(d) 17 wells, 500-feet deep, 80-foot lift.

(e) Alternative 2C assumes implementation of Alternative 2A; and Alternatives 3C and 4C assume impelmentation of Alternatives 3A and 4A, respectively.

(f) 20 wells, 500-feet deep, 80-foot lift.

(g) Total costs do not include cost to implement Zahm-Sansoni-Nelson plan described in Chapter IVG.

(h) Basis for O&M costs are discussed in Appendix F.

(i) Unit Conveyance Cost = $10/af.

(j) Unit Pumping Cost = $1.50/af.

(k) Unit Pumping Cost = $9.25/af.

(l) Values are multiplied by 0.5 because facilities are assumed to be used 5 out of 10 years.

TABLE IV K-3

FISH AND WILDLIFE RESOURCES

SAN LUIS NWR

Ducks

Mallard[a]
Gadwall[a]
American Wigeon[a]
Green-winged (Cinn) Teal[a]
Blue-winged Teal[a]
Cinnamon Teal[a]
Northern Shoveler[a]
Northern Pintail[a]
Canvasback[a]
Ring-necked Duck
Ruddy Duck[a]
Bufflehead
Wood Duck[a]
Lesser Scaup
Redhead[a]

Geese and Swans

White-Fronted Goose
Canada Goose
Ross' Goose
Cackling Canada Goose
Tundra Swan
Snow Goose

Coots and Grebes

Pied-Billed Grebe[a]
Eared Grebe
American Coot

Shore and Wading Birds

Snowy Egret[a]
American Avocet[a]
Lesser Sandhill Crane
Greater Sandhill Crane
Virginia Rail
Great Blue Heron[a]
American Bittern[a]
Green-backed Heron
Common Moorhen[a]
Marbled Godwit
Black-necked Stilt[a]
Common Snipe
Long-billed Dowitcher
White-Faced Ibis
Dunlin
Western Sandpiper
Black-crowned Night Heron[a]
Greater Yellowlegs
Willet
Long-billed Curlew
Egret[a]
Great
Sora
Lesser Yellowlegs

Upland Game

Mourning Dove[a]
Ring-Necked Pheasant[a]
Black-Tailed Jackrabbit
California Quail[a]
Cottontail Rabbit

TABLE IV K-3

FISH AND WILDLIFE RESOURCES

SAN LUIS NWR

(Continued)

Raptorial Birds

Black-shouldered Kite[a]
Cooper's Hawk
Rough-legged Hawk
Short-eared Owl[a]
Golden Eagle
Turkey Vulture
Northern Harrier[a]
Red-tailed Hawk[a]
American Kestrel (Sparrow Hawk)[a]
Great Horned Owl[a]
Screech Owl[a]
Sharp-shinned Hawk
Swainson's Hawk[a]
Barn Owl[a]
Burrowing Owl[a]
Red-shouldered Hawk[a]

Fish

Bass
Carp
Crappie
Bluegill
Catfish
Striped Bass
Sacramento Blackfish

Furbearers

Muskrats
Long-tailed Weasel
Gray Fox
Badger
Beaver
Coyote
Skunk
Mink
River Otter
Raccoon

Others

Tule Elk

Notes:

(a) Birds nesting on refuge

Source: Birds on San Luis, Merced and Kesterson National Wildlife Refuges (RF 11660-3. August 1984). NWRS Public Use Report (1)) and refuge records.

peregrinus anatum; the Valley elderberry longhorn beetle, *Desmocerus californicus dimorphus*; and the Aleutian Canada goose, *Branta canadensis leucopareia*. Numerous candidate species may occur in this area and are also presented in Table IV K-4.

All of the alternative plans would improve the habitat quality and bird use, as indicated in Table IV K-5. The improved habitat also would result in increased public use.

Implementation of any of the alternative plans probably would not adversely affect the listed and candidate threatened and endangered species and would improve their habitat. Detailed field investigations will be necessary during the advanced planning phase of the project. The No Action Alternative would result in the loss of habitat. Additional regional environmental analyses will be completed as part of the Water Contracting EIS's.

E. SOCIAL ANALYSIS

The social consequences of constructing and operating the selected plan would be positive due to the potential increase in public use.

F. POWER ANALYSIS

The Pacific Gas & Electric Company serves the Refuge under the PA-1 rate schedule for agricultural users. A facility must be an authorized function of the CVP to receive project-use power. The authority to deliver CVP project-use power to the Refuge is currently being examined and will be detailed in the Refuge Water Supply Planning Report. A more detailed discussion of project-use power and wheeling agreements is provided in the Power Analysis section of Chapter II.

G. PERMITS

Construction of any of the alternatives would require several permits. Merced County would issue permits for well construction and approvals for construction along all roadways and within drainage courses to ensure that the existing drainage facilities would not be adversely affected. Alternatives 2A and 2B, 3A and 3B, and 4A and 4B would require permits and approvals from the SLCC. Stream Alteration Permits would be required from the DFG for construction in the San Joaquin River for Alternatives 2B, 3B, and 4B. A Corps of Engineers permit may be required for construction activities in wetlands or riparian corridors.

TABLE IV K-4

FEDERALLY LISTED, PROPOSED, & CANDIDATE THREATENED & ENDANGERED SPECIES

SAN LUIS NWR

Listed Species

Mammals

San Joaquin kit fox, Vulpes macrotis mutica (E)

Birds

Bald eagle, Haliaeetus leucocephalus (E)
American peregrine falcon, Falco peregrinus anatum (E)
Aleutian Canada goose, Branta canadensis leucopareia (E)

Invertebrates

Valley elderberry longhorn beetle, Desmocerus californicus dimorphus (T)

Proposed Species

None

Candidate Species

Birds

Swainson's hawk, Buteo swainsoni (2)
White-faced ibis, Plegadis chihi (2)
Western snowy plover, Charadrius alexandrinus nivosus (2)
Tricolored blackbird, Agelaius tricolor (2)

Reptiles

Giant garter snake, Thamnophis couchi gigas (2)
California tiger salamander, Ambystoma tigrinium californiense (2)

Invertebrates

Molestan blister beetle, Lytta molesta (2)

Plants

Hispid bird's-beak, Cordylanthus mollis subsp. hispidus (2)
Delta coyote-thistle, Eryngium racemosum (1)
Bearded allocarya, Plagiobothrys hystriculus (2)
Valley spearscale, Atriplex patula subsp. spicata (2)

Source: USFWS, June 4, 1987

(E)—Endangered (T)—Threatened (CH)—Critical Habitat

(1)—Category 1: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

(2)—Category 2: Taxa for which existing information indicated may warrant listing, but for which substantial biological information to support a proposed rule is lacking.

TABLE IV K-5

WILDLIFE RECREATIONAL BENEFITS AND RESOURCE IMPACTS

SAN LUIS NWR

	No Action Alternative	Alternatives					
		2A	2B	2C	3A & 4A	3B & 4B	3C & 4C
Habitat Acres							
Permanent Water	--	80	80	80	150	150	150
Seasonal Marsh	--	2,950	2,950	2,950	3,400	3,400	3,400
Bird Use Days							
Ducks	--	10,702,000	10,702,000	10,702,000	15,630,000	15,630,000	15,630,000
Geese	--	270,000	270,000	270,000	800,000	800,000	800,000
Shorebirds & Wading	--	2,380,000	2,380,000	2,380,000	3,483,000	3,483,000	3,483,000
Endangered Species	--	10,100	10,100	10,100	14,200	14,200	14,200
Total	--	13,362,100	13,362,100	13,362,100	19,927,200	19,927,200	19,927,200
Public Use Days							
Consumptive	--	3,800	3,800	3,800	4,100	4,100	4,100
Non-Consumptive	--	18,600	18,600	18,600	31,000	31,000	31,000
Total	--	22,400	22,400	22,400	35,100	35,100	35,100
Total Annual Cost	--	$ 402,680	$ 181,830	$ 509,710	$ 459,180	$ 246,830	$ 584,810
Incremental Cost/Additional 1000 Bird Use Days	N/A	$ 30.10	$ 13.60	$ 38.10	$ 23.00	$ 12.40	$ 29.30
Incremental Cost/Additional Public Use Day	N/A	$ 18.00	$ 8.10	$ 22.80	$ 13.10	$ 7.00	$ 16.70

Notes: Alternatives 2A, 3A and 4A - Enlarge and Line San Luis Canal Company Facilities.
Alternatives 2B, 3B and 4B - Construct Lift Pump to utilize San Joaquin River.
Alternatives 2C, 3C and 4C - Implement a Conjunctive Use Plan.